CLAIMS

1. A device for monitoring the operation of an airplane control surface, the control surface being mounted on at least two arms each hinged about an axis on a portion of an airfoil, at least one of the two arms being mounted on the associated airfoil by a hinge that comprises at least one pivot, at least one U-bolt having at least two limbs with orifices in alignment on said axis for passing the pivot, and a captive member having an orifice for passing the pivot and having a limited range of displacement between the limbs of the U-bolt along the axis, the pivot possessing a cylindrical body, a head of cross-section that is not circularly symmetrical so as to enable it to co-operate with a driver tool for turning it, and a threaded end opposite from the head,

the device being characterized in that:

the pivot is constituted by a dynamometric pin comprising a body (10) of circularly cylindrical shape, a head (12) of cross-section that is not circularly symmetrical so as to enable it to co-operate with a driver tool for turning it, and a threaded end (14) opposite from the head (12), the body (10) of the pin having at least one peripheral set-back groove (16);

the body (10) of the pin has a cavity that opens out at one end of the body, that reaches at least the level of the set-back groove (16), and that contains at least one force-sensing element (18) disposed against the wall of the cavity level with the set-back groove (16), the opening of the cavity which opens out at one end of the body being closed in weatherproof manner while allowing wires connected at least to the force-sensing element (18) to pass through;

the head (12) and a nut screwed onto the threaded end are in direct or indirect contact with the limbs of the U-bolt, such that the groove (16) in the body of the pin overlies the interface between one of the limbs of

the U-bolt and the adjacent portion of the captive member;

the size of the displacement range of the captive member between the limbs of the U-bolt, and the width of the groove (16), presenting a relationship such that one edge of the groove (16) is located within the limb and the other edge is located within the captive member;

the head (12) has an angular position such that at least the sensing element is sensitive to forces acting across the length of the pin; and

the device further includes a signal processor circuit using at least one signal from at least one sensing element (18) of the pin to determine at least whether the control surface is present.

2. A device according to claim 1, characterized in that the pin has two grooves (16) each associated with at least one sensing element (18) and disposed respectively at the interfaces of the arm with each of the limbs.

3. A device according to claim 1 or claim 2, characterized in that the head (12) of the pin possesses a marker for angularly positioning at least the sensing element (18) relative to the U-bolt or to the captive member.

4. A device according to any preceding claim, characterized in that the pin includes, at least at the level of a groove (16), a plurality of sensing elements (18) disposed regularly in a circle so that the signals from the sensing elements enable the force to be determined independently of the angular orientation of the pin, by means of an operation selected between: selecting a sensing element (18) at a suitable angular orientation; and processing signals from a plurality of sensing elements (18) to derive a suitable signal.

5. A device according to any preceding claim, characterized in that the pin further includes an amplifier circuit card placed between at least one sensing element (18) and wires exiting from the pin.

6. A device according to any preceding claim, characterized in the pin further possesses packing (20) for passing in weatherproof manner wires connected at least to the sensing element (18).

7. A device according to any preceding claim, characterized in that the control surface is selected from: an aileron; a wing flap; an air brake; a tail stabilizer elevator; and a tail rudder.

8. The use of a dynamometric pin in determining the presence of an airplane control surface in the context of monitoring the operation of an airplane, the control surface being mounted on at least two arms, each hinged about an axis on a portion of an airfoil, at least one of the two arms being mounted on the associated airfoil by a hinge that comprises at least a pivot, at least a U-bolt having at least two limbs with orifices in alignment on said axis to pass the pivot, and a captive member having an orifice for passing the pivot and having a limited displacement range between the limbs of the U-bolt along the direction of the axis, the pivot possessing a cylindrical body, a head of cross-section that is not circularly symmetrical so as to enable it to co-operate with a driver tool for turning it, and a threaded end opposite from the head,

the use being characterized in that it comprises:

making a dynamometric pin comprising a body (10) of circularly cylindrical shape, a head (12) of cross-section that is not circularly symmetrical so as to enable it to co-operate with a driver tool for turning it, and a threaded end opposite from the head (12), the

dimensions in length and diameter of the body (10) of the pin being practically identical to those of the pivot, the body (10) of the pin having at least one peripheral set-back groove (16) and a cavity that opens out to one end of the body, that reaches at least the level of the set-back groove (16) at least, and that contains at least one force-sensing element (18) disposed against the wall of the cavity level with the set-back groove (16), the opening of the cavity that opens out to one end of the body being closed in weatherproof manner while allowing wires connected to the force-sensing element (18) to pass through;

replacing the pivot with the dynamometric pin so that the head (12) and a nut screwed onto the threaded end are in direct or indirect contact with the limbs of the U-bolt so that the groove (16) of the body of the pin overlies the interface between a limb of the U-bolt and the adjacent portion of the captive member, the size of the displacement range of the captive member between the limbs of the U-bolt and the width of the groove (16) presenting a relationship such that one edge of the groove (16) lies within the branch and the other edge within the captive member;

adjusting the angular position of the head (12) so that the sensing element (18) is sensitive at least to forces acting across the length of the pin; and

signal processing at least one signal from at least one sensing element (18) of the pin in order to determine at least whether the control surface is present.

9. A use according to claim 8, characterized in that the signal processing is for comparing the signal from at least one sensing element (18) with at least one element selected from a threshold value and a range of values.

10. A use according to claim 8, characterized in that the signal processing is for comparing the signals from at least two dynamometer pins.